CONTRIBUTION OF MULTIMEDIA COURSEWARE TOWARDS LEARNING IN OPEN DISTANCE LEARNING

Zoraini Wati Abas; Rosliza Osman
Centre for Instructional Design & Technology
Santhanadass Thangapragasam; P. Rajesh Kumar
Faculty of Science
Open University Malaysia

ABSTRACT

The use of interactive multimedia has been acknowledged as being able to help overcome some of the shortcomings in curriculum delivery. In Open Distance Learning institutions, where learners typically study in isolation and have reduced opportunities for direct instruction, interactive multimedia courseware appears to present itself as a useful method for instructing learners on topics which may be challenging otherwise. This paper highlights the use of an interactive multimedia courseware that had been specifically developed to teach a science course on basic techniques and laboratory safety at the Open University Malaysia (OUM). It also includes feedback from a pilot study designed to evaluate the effectiveness of the courseware. Conducted at the end of the semester, the feedback was obtained from three groups of learners. The questionnaire used was designed to collect feedback from learners on their understanding of the subject matter. The learners were asked to respond to the following aspects of the courseware: objectives, content and presentation; screen design, visual and technical elements, virtual lab content, and perceived added value. The learners responded to items based on a five-point Likert scale. Much has been learned from the pilot study. It was found that the usage of the multimedia courseware had helped learners achieve the learning outcomes and it is recommended that future learners be encouraged to use it.

INTRODUCTION

Providers of distance education today have to grapple with the challenges of structuring an education system that can meet the present and future demands of society. (Ford, 1996). In conjunction with this, Open and Distance Learning (ODL) providers have leveraged on technology to gain acceptance and recognition as an innovative and effective delivery mode of learning. Technologies can be used in various ways to facilitate learning in an ODL setting and have become indispensable in enhancing students ability to learn, communicate and understand. They also have the potential to transform students to become active learners, rather than as passive end users of unpalatable textbook knowledge. Furthermore, education technologies are invaluable in demystifying key concepts; the visual representation helps clarify concepts that might otherwise be unclear to the learner. As a result, students acquire vital process skills and deepen their understanding and appreciation of science.

As the use of technology becomes ever more pervasive and widespread, it is expected that multimedia courseware will become an important educational tool for ODL providers. One advantage of using multimedia technology is that it can offset the potential decline in the quality of education brought about by the increase in student population without a commensurate increase in the number and quality of teaching staff (Rahman, Tsoi and Dettrick , 1996).

An awesome variety of images and interactive visualizations are possible using multimedia. Consequently, multimedia could be a more engaging medium in communicating information more accurately to a student. An engaged student feels as though he or she is part of the learning process and is more likely to be intrinsically motivated. Allowing learners to navigate freely through the rich multimedia content enables a degree of self-learning and control. To this end, research has also shown that engagement increases when a learners feels that they have a sense of control over their own learning (Alderman, 1999). It is thus useful to determine what contribution this can have on learning in an ODL setting. In this regard, this study had sought to find out whether the use of a multimedia courseware has been effective in terms of having enabled the learner to understand the content better. The study also sought to determine on how this experience has added value to his learning.

BACKGROUND AND RATIONALE FOR THE STUDY

The Open University Malaysia is an open distance learning institution with an enrolment over 63,000 learners spread over 61 learning centres throughout the nation. Almost half of its learner population are teachers who remain in their jobs and attend OUM part-time. Their studies are funded by the government as part of the its effort to increase the number of graduate teachers in school. Among the programmes they are enrolled in is the Bachelor of Education (Science) degree program offered by the Faculty of Science. One of the courses that is compulsory is the course on Basic Techniques and Laboratory Safety. The students comprise government primary school and lower secondary school teachers who are distributed throughout the country.

OUM adopts a blended learning approach to suit the needs of its Open and Distance Learners. The blended learning approach in OUM encompasses five face-to-face tutorial sessions, self-managed learning and e-learning or online learning learning that is facilitated by the Learning Management System (LMS). The online learning component largely requires learners to go into online forums for discussions with each other and with the tutor on pre-determined topics. There is also a take home assignment and two tests conducted during the tutorial sessions and one final exam conducted under strict supervision.

For the course on Basic Techniques and Laboratory Safety, the learner is provided with a print module prepared by subject matter experts attached to various public universities in Malaysia, based on the curriculum approved by the local accreditation body. There is no mandatory laboratory component for this course. Since there was also no provision for a "hands-on" laboratory practical sessions for students to strengthen their understanding on

what they had read on the module, it was decided that a multimedia courseware would be the best substitute.

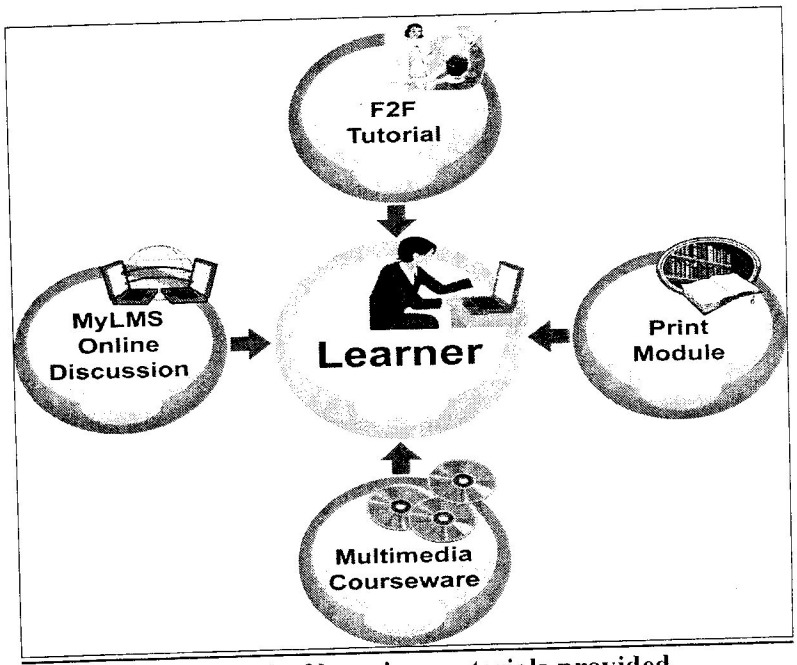

Figure 1. The blend of learning materials provided for Basic Techniques and Laboratory Safety

Following discussions with subject matter experts, three topics from the print module were selected for multimedia delivery that would be interactive enough to help students learn the topic. Developed by the Centre for Instructional Design and Technology, the courseware would integrate ODL pedagogy practices at OUM and multimedia technology. It was also felt that the use of a multimedia courseware that is rich in graphics, sound, video and animation would help students visualize and understand concepts and practices in laboratory activities, titration and sterilization. The possibility of creating a new level of interactive learning experience to enhance learners' understanding of the content and engaging the learners to practice laboratory activity virtually was also there. The exposure to multimedia can also be advantageous as it would allow learners to navigate freely through the content and enable self-learning anywhere anytime.

It was also noted that adult learners tend to learn concepts differently. Hence, there is a need to develop learning opportunities that can cater for different learning styles. This can be accomplished using multimedia courseware as it has the ability to cross over all students' learning styles and make learning fun (Michelle, Lamancusa, Engel, Jorgensen, Velez, 1997). It should also be noted that in any open and distance learning environment, students have limited face-to-face contact with their tutors. This can be offset by developing courseware that supplements the print-based module to satisfy the learning needs and expectations of students. The courseware consists of three lessons: (a) Safety Procedures in the Laboratory: Chemistry, Biology & Physics; (b) Basic Techniques in

Chemistry: Titration Techniques; and (c) Basic Techniques in Sterilisation. The lessons were designed to be learner-friendly so as to help them learn each of the identified topics. By the end of each lesson, learners were expected be able to identify: (a) the importance of adhering to guidelines on laboratory procedures; (b) the steps involved in titration techniques; and (c) the techniques involved sterilisation. The screen captures of various sections of the courseware are provided in Figures 2 through 6.

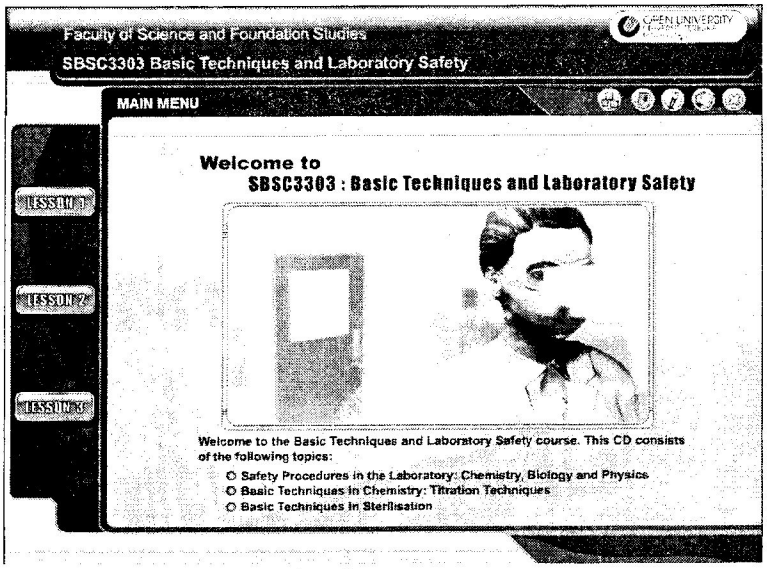

Figure 2. The Welcoming Screen

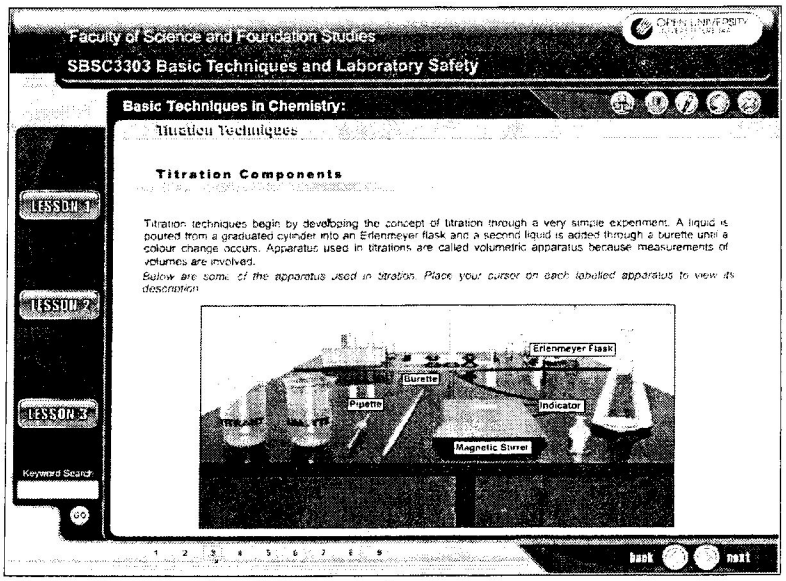

Figure 3. Sample of Content Screen

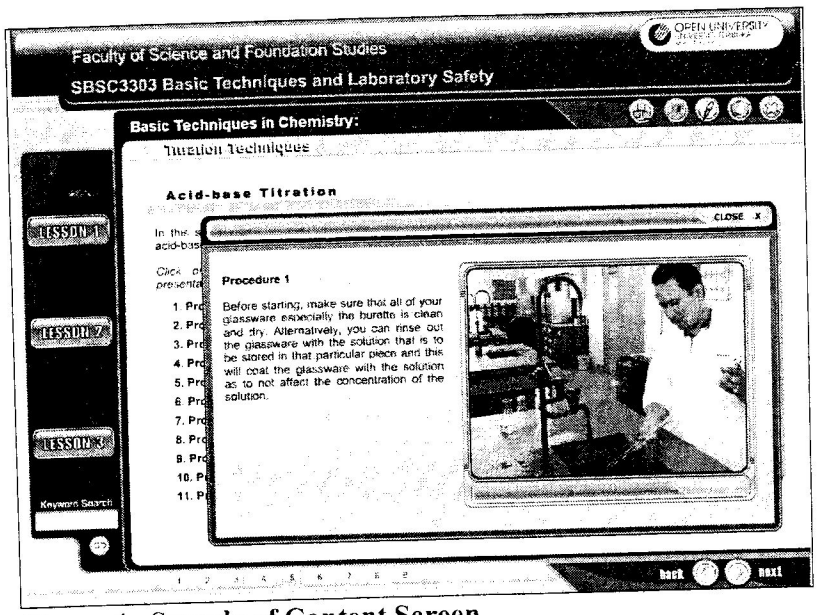

Figure 4. Sample of Content Screen

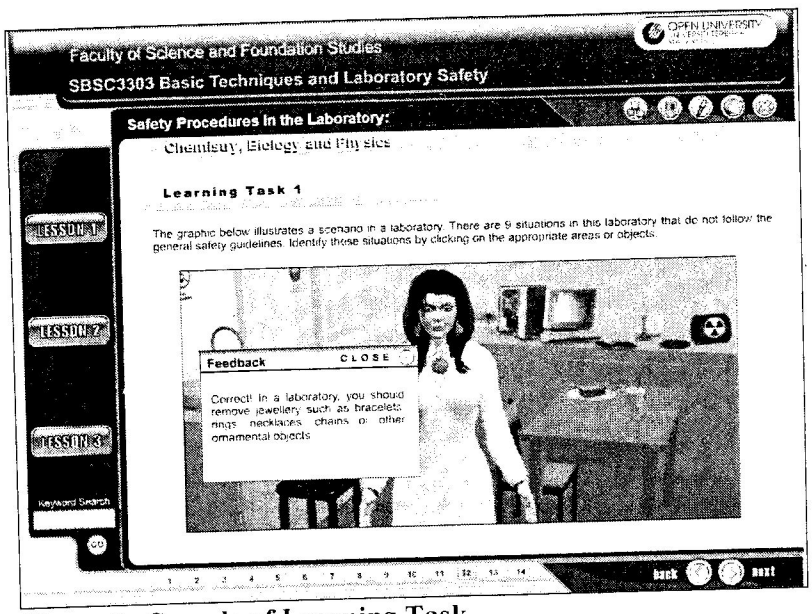

Figure 5. Sample of Learning Task

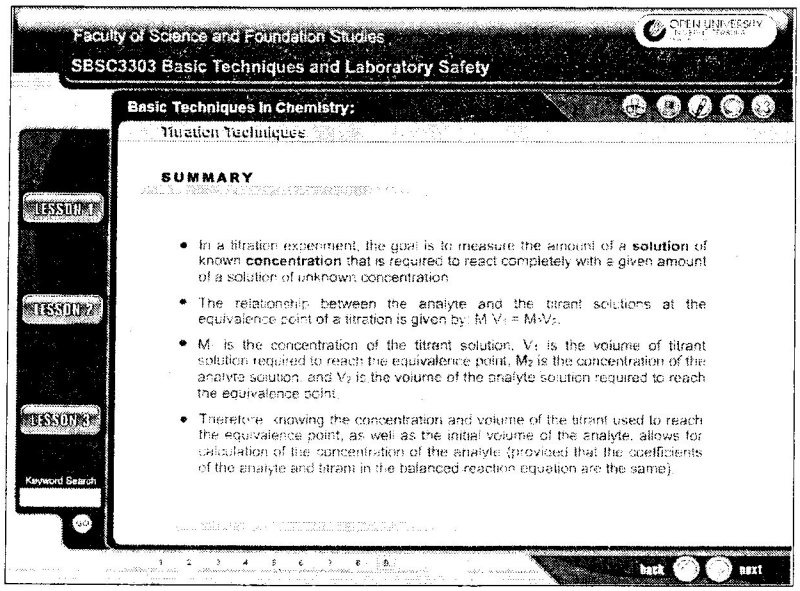

Figure 6. The Summary Screen

THE STUDY

The main purpose of this study was to determine the effectiveness of the multimedia courseware developed as a supplement to the print module. This study was conducted with three groups of learners to determine whether the developed courseware helped students understand the content of the course better. Also, the researchers sought to ascertain whether the graphics and simulations in the virtual laboratory had assisted in creating an interactive learning environment that was engaging for the learner. Besides, the study also sought to determine the learners' preference for the mode of learning (print module or courseware) and whether the students felt motivated to complete the courseware. Finally, the study sought to ascertain whether learners were able to achieve the learning outcomes set by the team who developed the courseware.

A courseware evaluation form was specially designed to get students feedback on the contribution of multimedia courseware towards their learning experience. Forty students from three learning centers responded to the survey. The forms were distributed to students who were enrolled in the May 2007 semester. The total enrolment for the course was 503 students. The evaluation form included statements to evaluate certain components such as objectives, content and presentation as well as the virtual lab content and to determine whether the courseware had brought added value. Out of 16 statements, 14 of them require the respondents to indicate their response according to the rating based on a Likert scale (see below):

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

One overall statement was for students to rate the courseware according to the rating below:

Very Poor	1	2	3	4	5	6	7	8	9	10	Excellent

The evaluation form also included one open-ended question asking for suggestions to improve the courseware. The findings are as shown in Tables 1 and 2.

FINDINGS AND DISCUSSIONS

Of the 40 respondents, 23.0% strongly agreed whilst another 58 percent agreed that the objectives provided in the courseware were clear. On whether the content presented in the courseware has met the courseware objectives, 81 percent indicated that they agreed or strongly agreed. A big majority at 72.5% agreed that it was clearly understood while only 12.5% agreed strongly with the rest remained neutral. Again, it could be said that a big portion of the respondents agreed that the content of the courseware was easily understood.

Eighty percent of the respondents agreed or strongly agreed that the simulations helped them to understand the content better. The majority again, that is, 72.5 percent of the respondents stated that the interactivity in the courseware allowed them to understand the content better.

From these findings, none of the respondent disagreed on any aspect of the content of the courseware, which further implies that the content delivered through this medium was widely accepted by the audience. They think that it was clearly explained, well organized and easily understood.

On the questions and feedback provided in the courseware, whether the questions were designed at different levels of difficulty, 52.5% agreed, and another 10% strongly agreed. The remaining 37.5% stayed neutral. A slightly different scenario could be observed regarding the number of questions with majority of them, at 42.5% prefer to stay neutral on whether the questions were sufficient for them to understand the content, with only 12.5% agreed strongly and 40.0% merely agreed on this. The remaining 5% disagreed on this assumption. The results implies that the questions in general were quite clear and designed at different difficulty levels but the numbers of question seems insufficient in understanding the content.

When asked about the ability of the courseware to meet the needs of a learner. The result shows that 52.5% of them agreed that the courseware was helpful while 17.5% strongly agreed on this, while the rest at 30.0 % stayed neutral and none disagreed. The high portion that agreed, at 70.0%, implies that in general the courseware met the needs of the learner.

Table 1: Responses to the Survey on SBSC3303 Courseware

No	Statements	Frequency				
		1 (Strongly Disagree) N (%)	2 (Disagree) N (%)	3 (Neutral) N (%)	4 (Agree) N (%)	5 (Strongly Agree) N (%)
1.	The objectives provided in the courseware were clearly defined.	0 0%	0 0%	8 20%	23 58%	9 23%
2.	The content presented in the courseware has met the course objectives.	0 0%	0 0%	8 20%	23 58%	9 23%
3.	The content was easily understood.	0 0%	0 0%	6 15%	29 72.5%	5 12.5%
4.	The simulations helped me to understand the content better	0 0%	0 0%	8 20%	23 57.5%	9 22.5%
5.	The interactivity in the courseware allowed me to understand the content better.	0 0%	0 0%	11 27.5%	22 55%	7 17.5%
6.	The questions designed were at different levels of difficulty.	0 0%	0 0%	15 37.5%	21 52.5%	4 10%
7.	The feedback to my responses was helpful.	0 0%	0 0%	11 27.5%	22 55%	7 17.5%
8.	The number of questions was sufficient for me to understand the content.	0 0%	2 5%	17 42.5%	16 40%	5 12.5%
9.	The courseware met my needs as a learner.	0 0%	0 0%	12 30%	21 52.5%	7 17.5%
10.	The graphics helped me to better understand the content.	0 0%	0 0%	11 27.5%	21 52.5%	8 20%
11.	The graphics/simulations/3D animations presented in the virtual lab helped me to understand how to conduct an experiment virtually.	0 0%	1 2.5%	13 32.5%	22 55%	4 10%
12.	The virtual lab helped me to visualize the real experiment in the lab.	0 0%	0 0%	12 30%	21 2.5%	7 17.5%
13.	I preferred to learn from the courseware rather than read the print module.	0 0%	2 5%	11 27.5%	22 55%	5 12.5%
14.	I felt motivated to complete the courseware.	0 0%	0 0%	11 27.5%	22 55%	7 17.5%

The final part of this analysis is on the added value of the courseware in learning the topic. Though a small minority, at only 5.0% disagreed, more than half of them, at 55.0% agreed that they preferred to learn from the courseware rather than read the printed modules. Another 12.5% agreed strongly on this with 27.5% of them on neutral ground. Next, when asked whether they felt motivated to complete the courseware, a total of 55.0% of the respondents agreed and 17.5% strongly agreed. The remaining 27.5% preferred to stay neutral. None disagreed.

This analysis covers the results obtained from a construct that judges the delivery and the learning of the multimedia courseware. Overall, as indicated by Table 2, 30% of the respondents gave a rating of above average to the courseware and 62.5% rated towards excellent. None commented negatively on the courseware. When asked for suggestion on how to improve the courseware, respondents suggested that more questions be added and that similar courseware should be developed for other OUM courses. One respondent suggested that the content pages of the courseware be printed for them. Another respondent praised OUM's effort to develop the courseware. From these remarks, it can be seen that learners found the courseware useful and were suggesting that OUM enhances the courseware to make it even more learner-friendly so as to assist them with the understanding of the subject matter.

Table 2: Overall Rating of the SBSC3303 Courseware

	1 Very Poor	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10 Excellent**
N	0	0	1	0	2	5	7	20	4	1
%	0%	0%	2.5%	0%	5%	12.5%	17.5%	50%	10%	2.5%

CONCLUSION AND RECOMMENDATIONS

There is little doubt about the advantages of using multimedia technologies in assisting educators to achieve educational effectiveness. These technologies have been adopted and have succeeded in generating better interactivity between the learner and the content. The contribution of an in-house designed and developed multimedia courseware for the Basic Techniques and Laboratory Safety course had been overwhelmingly positive. The results indicate that in general, almost two-thirds of the respondents believed that the courseware was a good supplementary learning material to support the content of the print module. Most interesting was the finding that the learners also felt highly motivated to complete it. It appears that the flexible learning approach through multimedia will improve the teaching time, method and the quality of learning. In trying to provide an optimized learning experience, OUM has formulated a blended learning pedagogy to support the delivery of a science course to students around. The blend is expected to enable OUM to leverage on technology to better cope with its rapid growth in the number of students located in 61 learning centres.

In conclusion the survey shows that incorporating multimedia technology in a virtual world with undisputable quality learning content will achieve the learning outcomes appropriate to the specific needs of the open and distance learners. It is recommended that in the future, a similar study is conducted on a bigger scale involving a larger number of respondents. It would also be interesting to see where there is a difference between students with different demographic variables such as age, gender and location when determining the effectiveness of the courseware in helping learners to achieve the learning outcomes. For the next semester the course is offered, the researchers recommend that the learners in future utilize the complimentary CD to the fullest as it can be expected that the majority will benefit from it

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